Paper No. 18

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte MICHAEL ODER

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Appeal No. 2002-1828
Application 09/424,606

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ON BRIEF

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Before FRANKFORT, STAAB, and McQUADE, Administrative Patent Judges.

FRANKFORT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 12 through 27, which are all of the claims remaining in this application. Claims 1 through 11 have been canceled.

Appellant's invention relates to a method for operating an internal combustion engine (claim 12), a control element for a

control unit of an internal combustion engine (claim 24), and an internal combustion engine including such a control unit (claim 27), wherein an optimal switchover is possible between stratified fuel injection operation during a compression phase (first mode) and homogeneous operation during an intake phase (second mode), with the switchover taking place from the first mode initially to a transitional operation of the second mode and then to normal operation of the second mode, thereby leading to a significantly lower increase of the torque generated by the internal combustion engine at the time of such switchover. Independent claims 12, 24 and 27 are representative of the subject matter on appeal and a copy of those claims can be found in Appendix A of appellant's brief.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Iida et al. (Iida '947)	5,970,947	Oct. 26, 1999
Kamura et al. (Kamura)	WO 98/09063[1]	Mar. 5, 1998

[1] Our understanding of the above-noted foreign language document (WO 98/09063) relied upon by the examiner is based on an English language equivalent, U.S. Patent No. 5,975,044. The examiner makes clear on page 3 of the answer (Paper No. 14) that it is the publication date of March 5, 1998 of WO 98/09063 that is being relied upon. Appellant has not disputed that this document is prior art to him.

Claims 12 through 27 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Iida '947.

Claims 12 through 27 additionally stand rejected under 35 U.S.C. § 102(b) as being anticipated by Kamura.

Rather than reiterate the examiner's full commentary with regard to the above-noted rejections and the conflicting viewpoints advanced by appellant and the examiner regarding those rejections, we make reference to the examiner's answer (Paper No. 14, mailed December 4, 2001) for the reasoning in support of the rejections, and to appellant's brief (Paper No. 13, filed August 7, 2001) and reply brief (Paper No. 15, filed February 20, 2002) for the arguments thereagainst.

OPINION

In reaching our decision in this appeal, we have given careful consideration to appellant's specification and claims, to the applied prior art references, and to the respective positions articulated by appellant and the examiner. As a consequence of our review, we have made the determinations which follow.

In rejecting claims 12 through 27 under 35 U.S.C. § 102(b) as being anticipated by Iida '947, the examiner has noted that this patent teaches a direct injection spark ignition engine wherein gasoline fuel is directly injected into the combustion chamber of a cylinder in a variety of modes, which modes are depicted in Figure 3 of the patent. More particularly, the examiner has determined (answer, page 3) that the second term lean mode seen in Figure 3 of Iida '947 and described therein corresponds to appellant's first mode, that the first-term lean mode of Iida '947 corresponds to appellant's transition mode and that the stoichio-feedback mode therein corresponds to appellant's second mode. Further insight is provided on pages 4 and 5 of the answer, wherein the examiner notes that Iida '947 is directed to solving the same problem as appellant, which is suppressing a torque shock when switching from a first mode of injection in the compression phase to a second mode of injection during an intake phase, and that both appellant and Iida '947 solve this problem by having a transition mode of injection which is a lean homogeneous mode wherein fuel is injected during the intake stroke of the piston.

Appellant's response to the examiner's rejection essentially consists of an assertion that the system and method of Iida '947 are very different than what is being disclosed and claimed by appellant (however, without any explanation from appellant as to why or how they are different); an assertion that the examiner has not shown how the indicated modes in Iida '947 correspond to appellant's claimed modes; and an assertion that Iida '947 teaches away from appellant's invention.

Having reviewed and evaluated Iida '947, we must agree with the examiner that the method, control element (70) and internal combustion engine disclosed therein anticipate the corresponding method, control element and internal combustion engine claimed by appellant. As noted in column 3, lines 55-60, of Iida '947, the objective therein is to provide a control apparatus and method for a cylinder-injection spark-ignition internal combustion engine, which apparatus and corresponding method are capable of always maintaining an appropriate combustion state and a stabilized engine operating state in which no substantial torque shock is caused upon changeover of injection mode. Of particular importance in this regard is the disclosure at column 5, lines 11-56, of Iida '947, wherein a transitional operation is broadly

described between first and second injection modes and includes both transitional operation at a first change speed in the first mode before the actual changeover point and transitional operation at a second change speed in the second mode immediately following changeover, with gradual transition to normal second mode operation. At column 6, lines 12-24, it is made clear that

> the air-fuel ratio transition means sets the first and second change speeds in dependence on a quantity of intake air amount adjustment, which is effected by intake air amount adjusting means provided in the internal combustion engine, for adjusting the intake air amount in accordance with the output from the acceleration state detecting means. In this case, the first and second change speeds can be set to follow a control for increasing or decreasing the intake air amount, so that the fuel injection amount can be changed depending on the increasingly or decreasingly controlled intake air amount. As a result, it is possible to adequately prevent a change in the engine output torque upon changeover the injection mode.

Although Iida '947 provides for transitional operation in both the first and second modes around the injection mode changeover point, we note that appellant's claims on appeal do not preclude additional transitional operation in the first mode prior to the changeover point, and we emphasize again that Iida '947 clearly provides for transitional operation of the second mode initially upon switching from the first mode to the second mode and then switches from transitional operation of the second

mode to normal operation of the second mode (i.e., with the transition during the second mode occurring at a second change speed smaller than the first change speed (in the first mode) so that a torque shock after the changeover of injection mode is reduced appropriately). Contrary to appellant's assertions, we see nothing in Iida '947, column 12, lines 28-34, which teaches away from appellant's invention. As the examiner has indicated, the second-term injection lean mode of Iida '947 corresponds to appellant's first mode, while the first-term injection lean mode encompasses appellant's transitional mode, and the stoichio-feedback mode corresponds to appellant's normal second mode. Although Iida '947 also has an additional open-loop mode of injection, nothing in appellant's claims on appeal precludes any such additional injection mode.

For the above reasons, we will sustain the examiner's rejection of independent claims 12, 24 and 27 under 35 U.S.C. § 102(b) as being anticipated by Iida '947. As is apparent from appellant's statement of the grouping of claims on page 3 of the brief, appellant has chosen not to argue claims 13-23 separately from independent claim 12, and claims 25 and 26 separately from independent claim 24, from which they depend. Accordingly, we

consider that claims 13 through 23 fall with claim 12 and that claims 25 and 26 fall with claim 24.

The next rejection for our review is that of claims 12 through 27 under 35 U.S.C. § 102(b) as being anticipated by Kamura. Having reviewed Kamura, particularly Figures 1, 4, 5 and 6, and the disclosure associated therewith, we agree with the examiner that the later lean mode, seen in Figure 1 as being performed during the compression stroke, corresponds to appellant's first mode, and that the earlier lean mode and stoichiometric mode, seen in Figure 1 as being performed during the intake stroke of the piston, respectively, correspond to appellant's transitional operation of the second mode and normal operation of the second mode.

Kamura notes (e.g., col. 3, lines 60+), that the invention therein provides a control unit for an in-cylinder injection internal combustion engine in which fuel is directly injected into a combustion chamber and which is adapted to select, according to an operation state of the engine, a compression stroke injection mode for mainly injecting fuel at a compression stroke and an intake stroke injection mode for mainly injecting

fuel at an intake stroke. Column 3, lines 13-18, make clear that the compressed lean mode (later lean mode of Fig. 1) is selected in a region where both engine rotational speed and engine load are low; whereas, as the engine rotational speed and engine load increases therefrom, and an injection mode changeover is required, the intake lean mode (earlier lean mode of Fig. 1), the stoichiometric mode, and enriched mode are successively selected in response to the magnitude of the increase. Kamura notes (col. 4, lines 13-22) that the relationship between the operation state and the intake correction amount is set differently between the compression stroke injection mode and the intake stroke injection mode, and that owing to the configuration of the control, the intake amount can be appropriately corrected for each of the operational modes such as compression stroke injection mode and intake injection stroke mode in the in-cylinder injection internal combustion engine, thus allowing drivability to improve.

Aside from a bare assertion (brief, pages 6 and 7), appellant has provided no reasoning as to why the examiner's determination regarding the correlation of the noted modes in Kamura (Figs. 1 and 6) do not correspond to appellant's claimed fuel injection modes, particularly the examiner's determination

that the "earlier lean mode" of the intake stroke injection mode in Kamura corresponds to appellant's transitional operation of the second mode, while the stoichiometric mode in the intake stroke injection mode corresponds to appellant's normal operation of the second mode. As for appellant's assertion that Kamura teaches away merely because it provides four fuel injection modes, we see no basis for any such conclusion and again point out that additional modes, such as the enriched mode in Kamura, are not precluded by appellant's open-ended "comprising" format claims before us on appeal.

In light of the foregoing, we will sustain the examiner's rejection of claims 12 through 27 under 35 U.S.C. § 102(b) based on Kamura.

In Summary, the decision of the examiner rejecting claims 12 through 27 under 35 U.S.C. § 102(b) as being anticipated by Iida '947 and rejecting claims 12 through 27 under 35 U.S.C. § 102(b) as being anticipated by Kamura are both affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

CHARLES E. FRANKFORT Administrative Patent Judge	)	
LAWRENCE J. STAAB Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
JOHN P. McQUADE Administrative Patent Judge	)	

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